

A SPATE OF GLOWWORMS (COLEOPTERA: PHENOGODIDAE)¹

Steven R. Wing²

ABSTRACT: At several flooded sites phenogodid larvae, tentatively identified as *Phengodes nigromaculata*, were found in far greater abundance than any previously reported.

Beetles of the family Phenogodidae are notable for their spectacular bioluminescence (Tiemann 1970), their extreme sexual dimorphism (Tiemann 1967, Lloyd 1979), and their scarcity (Smith 1900). Females and larvae are especially uncommon, though males occasionally turn up in light traps. Phenogodids of the genus *Phengodes* are so rare that Harvey (1952) saw "only four living luminous specimens in 25 years." I was surprised, then, to encounter 90 such specimens in one hour.

The observations were made in a field of grass [mostly *Axonopus affinis* Chase and *Eremochloa ophiuroides* (Munro) Hack.] with scattered pine trees, north of the Gainesville Regional Airport in Alachua County, Florida. This area has been searched for glowing organisms on the ground almost nightly during April-October over the past three years. In that time only one phenogodid was found.

This year phenogodids were flooded from the soil in large numbers. The area is usually dry, but heavy rains in 1983 left water standing in ditches and low areas. Glowing phenogodid larvae were found in every flooded site in the area shown in Fig. 1, but not in the ditch or in flooded sites to the north, west, and east of the area shown. The larvae, tentatively identified as *Phengodes nigromaculata* Wittmer, measured 0.7 to 2.1 cm in length ($n=10$). They were found clinging to grass that protruded from the water. No larvae were found in the unflooded area between sites (Fig. 1). As the soil dried, the larvae apparently returned underground. The sites were inspected on nights subsequent to each inundation, but no larvae were seen.

One night I spent about one hour walking through the inundated sites and found 90 larvae. More thorough searches were made in 1 m² plots on different nights and at different sites (Table 1). The average count was 5 larvae/M². If this reflects the phenogodid density in the area between flooded sites, thousands of larvae occur there. Five larvae/m² may be an underestimate because only glowing larvae were counted (see Tiemann 1970). Although it has long been known that phenogodids occur in soil (Atkinson 1887), densities of this magnitude have never before been

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²Dept. Entomology and Nematology, 3107 McCarty Hall, University of Florida, Gainesville, FL 32611.

reported (see Tiemann 1967).

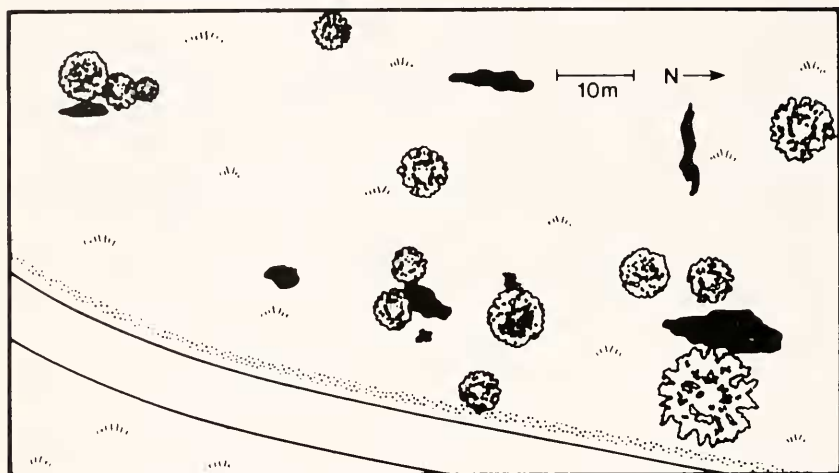


Figure 1. A map showing flooded sites (black), the ditch (stippled) beside a paved road, and some of the trees in the study area.

Table 1. Mean number of *Phengodes* larvae counted in flooded 1 m² plots.

Date	Plots (n)	Number \bar{x}	of Larvae range
14 August 1983	3	5	5-6
6 September 1983	4	6	5-7
13 September 1983	10	5	2-8

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LITERATURE CITED

- Atkinson, G.F. 1887. Observations on the female form of *Phengodes laticollis* Horn. Am. Nat. 21: 853-856.
 Harvey, E.N. 1952. Bioluminescence. Academic, New York. 649 pp.
 Lloyd, J.E. 1979. Sexual selection in luminescent beetles. Pages 293-342 in M. Blum and N. Blum, eds. Sexual selection and reproductive competition in insects. Academic, New York.

- Smith, J.B. 1900. The insects of New Jersey. MacCrellich and Quigley, Trenton, NJ.
- Tiemann, D.L. 1967. Observations on the natural history of the western banded glowworm *Zarhipis integripennis* (Lec.). Proc. Cal. Acad. Sci. 35(12): 235-264.
- Tiemann, D.L. 1970. R.F. Sisson, photographer. Nature's toy train, the railroad worm. Nat. Geog. Mag. 138: 56-67.

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